WHAT IS CLAIMED IS

1. A metal interconnection buried in an insulation film comprising:

a barrier layer formed on the insulation film;

an adhesion layer containing zirconium formed on the barrier layer; and

an interconnection material containing copper as a main component formed on the adhesion layer.

2. A metal interconnection buried in an insulation film comprising:

an adhesion layer containing zirconium formed on the insulation film;

a barrier layer formed on the adhesion layer; and

an interconnection material containing copper as a main component formed on the barrier layer.

3. A metal interconnection according to claim 1, further comprising:

islands of a copper-zirconium alloy spaced from each other formed between the adhesion layer and the barrier layer.

4. A metal interconnection according to claim 3,

wherein the islands of the copper-zirconium alloy are formed on the barrier layer, projected toward the adhesion layer and buried in the adhesion layer in mesh with the adhesion layer.

5. A metal interconnection buried in an insulation

film comprising:

a barrier layer formed on the insulation film;

an adhesion layer containing a metal material having a solid solubility limit of not more than 20 wt% in copper and a resistivity increase of not more than 19.8 % when solved in copper formed on the barrier layer; and

an interconnection material containing copper as a main component formed on the adhesion layer.

6. A semiconductor device comprising:

a base substrate having a semiconductor substrate and a semiconductor element formed on the semiconductor substrate;

an insulation film formed on the base substrate, the insulation film having an opening; and

a metal interconnection formed buried in the opening including:

a barrier layer formed on an inside wall and a bottom of the opening;

an adhesion layer containing zirconium formed on the barrier layer; and

a metal interconnection material containing copper as a main component formed on the adhesion layer.

7. A semiconductor device comprising:

a base substrate having a semiconductor substrate and a semiconductor element formed on the semiconductor substrate;

an insulation film formed on the base substrate, the insulation film having an opening; and

a metal interconnection formed buried in the opening including:

an adhesion layer containing zirconium formed on an inside wall and a bottom of the opening;

a barrier layer formed on the adhesion layer; and

a metal interconnection material containing copper as a main component formed on the barrier layer.

8. A semiconductor device according to claim 6, further comprising:

islands of a copper-zirconium alloy spaced from each other formed between the barrier layer and the adhesion layer.

9. A semiconductor device according to claim 6, further comprising:

islands of a copper-zirconium alloy spaced from each other formed in the adhesion layer.

10, A semiconductor device according to claim 8,

wherein the islands of the copper-zirconium alloy have a thickness of not more than 30 nm.

11. A semiconductor device according to claim 8,

wherein the islands of the copper-zirconium alloy have a diameter of not more than 20 nm.

12. A semiconductor device according to claim 8,

wherein the islands of the copper-zirconium alloy are

spaced from each other at a space of not less than 2 nm and not more than 20 nm.

13. A semiconductor device according to claim 6, wherein the opening includes an interconnection groove and a via hole opened in the interconnection groove.

14. A method for forming a metal interconnection buried in an insulation film, comprising the steps of:

forming a barrier layer on the insulation film;

forming an adhesion layer containing zirconium on the barrier layer; and

forming an interconnection material containing copper as a main component on the adhesion layer.

15. A method for forming a metal interconnection buried in an insulation film, comprising the steps of:

forming an adhesion layer containing zirconium on the insulation film;

forming a barrier layer on the adhesion layer; and

forming an interconnection material containing copper as a main component on the barrier layer.

16. A method for forming a metal interconnection according to claim 14, further comprising, after the step of forming the barrier layer, the step of forming islands of copper as a main component spaced from each other on the barrier layer.

17. A method for fabricating a semiconductor device comprising the steps of:

forming an insulation film on the base substrate having a semiconductor substrate and a semiconductor element formed on the semiconductor substrate;

selectively removing the insulation film to form an opening in the insulation film;

forming a barrier layer on the insulation film and a region where the opening is formed;

forming a first adhesion layer containing zirconium on the barrier layer;

forming an interconnection material containing copper as a main component on the first adhesion layer so as to fill the opening; and

removing the interconnection material, the first adhesion layer and the barrier layer by polishing the same until the insulation film is exposed to form the metal interconnection of the interconnection material, the first adhesion layer and the barrier layer buried in the opening.

18. A method for fabricating a semiconductor device according to claim 17, further comprising, after the step of forming the barrier layer, the step of forming islands of copper as a main component spaced from each other on the barrier layer.

19. A method for fabricating a semiconductor device according to claim 18, further comprising, before the step of forming the islands, the step of forming the second adhesion layer containing zirconium on the barrier layer.

20. A method for fabricating a semiconductor device according to claim 17, further comprising the steps of:

forming a seed layer of copper as a main component on the adhesion layer; and

subjecting the semiconductor substrate to a heat treatment to diffuse zirconium in the adhesion layer into the seed layer.

21. A method for fabricating a semiconductor device according to claim 18, further comprising the steps of:

forming a seed layer of copper as a main component on the adhesion layer; and

subjecting the semiconductor substrate to a heat treatment to diffuse the zirconium in the adhesion layer into the seed layer and the islands.

22. A method for fabricating a semiconductor device comprising the steps of:

forming an insulation film on the base substrate having a semiconductor substrate and a semiconductor element formed on the semiconductor substrate;

selectively removing the insulation film to form an opening in the insulation film;

forming an adhesion layer containing zirconium on the insulation film and a region where the opening is formed;

forming a barrier layer on the adhesion layer;

forming an interconnection material containing copper as a main component on the barrier layer so as to fill the

opening; and

removing the interconnection material, the barrier layer and the adhesion layer by polishing the same until the insulation film is exposed to form the metal interconnection of the interconnection material, barrier layer and the adhesion layer buried in the opening.

23. A method for fabricating a semiconductor device according to claim 18,

wherein in the step of forming islands, the islands are formed in a thickness of not more than 30 nm.

24. A method for fabricating a semiconductor device according to claim 18,

wherein in the step of forming islands, the islands are formed in a diameter of not more than 20 nm.

25. A method for fabricating a semiconductor device according to claim 18,

wherein in the step of forming islands, the islands are formed, spaced from each other by a space of not less than 2 nm and not more than 20 nm.